Seasonal occurrences and abundances of six common migratory waders in Botany Bay, 1942–1966, a documentation and analysis of Arnold McGill's long-term data set

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ABSTRACT

Times of occurrence and abundances of five Palearctic, and one New Zealand, migratory waders in Botany Bay over the period 1942 to 1966, are documented from Arnold McGill's unique data set. The Sharp-tailed Sandpiper occurred from early September to the end of February; Red-necked Stint from beginning of September to early March; Bar-tailed Godwit from September to April; Golden Plover, October–April; and Double-banded Plover from late March to late August. Taking into account birds on passage the sandpiper was most abundant in the first years, the stint from 1952 to 1959; godwit from 1952 to 1959; curlew sandpiper from 1957 to 1966; numbers of the two plover species were relatively constant. It is suggested that the variation reflects level of success on the breeding grounds, not changes in the quality of the Botany Bay habitat since degradational changes in the latter had not then occurred. The study emphasizes the great importance of Botany Bay as a wader habitat; it is still a good place to "see" waders but only future quantitative counts will show its current status. Data on quality of the feeding habitat, in addition to changes in area, is needed. Future wader conservation necessitates a simultaneous study of *all* major feeding grounds for waders along the east coast.

INTRODUCTION

Botany Bay and, especially the wide sand-flats at the northern end between Cooks River and La Perouse, have long been recognized as one of the most important feeding areas on the New South Wales coast for migratory waders. The width of the flats exposed at low tide was about 400 m, and their length in excess of a kilometre. They were visibly rich in invertebrate life, with a small green oligochaete having a density of up to 10 per square metre (pers. obs.).

From the 1940s onwards the waders of the flats were the focus of attention by Sydney ornithologists. Arnold McGill was pre-eminent in the studies and from 1942 to 1965 made some 200 surveys, alone or with Keith Hindwood, Ernie Hoskins, and myself. It is important that the results of these surveys be put on permanent record and here I take Arnold McGill's field lists and incorporate some additional data by myself and others. Making the data available is important in that the area has been severely impinged upon by airport and shipping container port development. It provides a basis relative to which modern counts can be assessed.

Interest in migratory waders in the Sydney ornithological community surged in the late 1930s when Serventy (1938) showed how, by studying the distribution of white on the tail and on the wing, colour of the legs, and length and shape of the bill, it was possible to identify these otherwise similar-looking birds. It was Keith Hindwood who introduced Arnold and I to the Botany Bay flats. The earlier trips were multi-person affairs with Keith Hindwood, Arnold and myself, Ernie Hoskin, and others taking part. I was a regular companion of Arnold for his first couple of years. Several of Arnold's trips each year would be with Keith Hindwood after that and, jointly, they worked out the identities of some of the rarer and more difficult species. Arnold was ultimately to become perhaps Australia's most knowledgeable wader expert. Early papers by the Sydney "wader group" included Hindwood (1942), McGill (1943, 1947), and McGill and Keast (1945)

METHODS

The flats would be visited just as the tide was running out so that maximum time would be spent with the birds as they fed. The counts would start from immediately adjacent to the Cooks River mouth. Walking slowly eastwards we would identify and count each group of waders. As the waders flushed the direction of flight would be noted so as not to count the same flocks twice. A kilometre would be so covered and then the remaining stretch of sand explored long-distance by field-glasses to confirm proportions of species and make the count as complete as possible.

The greatest number of visits were made in 1942 and 1943, with 13 and 15 visits respectively by Arnold or Arnold jointly with others of us, and six and seven additional visits by myself. During the 1944–1945 wartime years with severe petrol rationing Arnold was only able to make a few visits to the flats. From 1947 onwards the number of visits a year to the flats was 15–20, 75–80% of them being by Arnold or with Arnold as a member of the group. In any year three-quarters would be made during the August-April period when the northern migrants were passing through on passage or summering in the Bay, with the remainder being directed at the Double-banded Dotterel or Plover *Charadrius bicinctus*, a winter visitor from New Zealand.

Because the visits were rather scattered in time I have consolidated the data into series of two (1942–1943) and three (other years) averages. In doing so, if a single seven-day period was only visited once during the two or three years, its counts stand, if twice or more an average for the particular period is struck. This objective is both to give the most accurate average picture of arrival and departure (including "passage" dates), and best bring out any longer-term shifts in abundance. In the latter obviously the summer data is more valid, it representing the period of stability: at migration times numbers fluctuate greatly as flocks arrive and depart. In the graphs, data from 1942 and 1943 (when most trips were made) is grouped, as is that from 1946 to 1948, 1952 to 1954, 1957 to 1959, and 1964 to 1966. Too few trips were made in the other years for the data to warrant inclusion.

Data is given only for the six common species: Sharp-tailed Sandpiper *Erolia acuminata*, Red-necked Stint *E. ruficollis*, Bar-tailed Godwit *Limosa lapponica*, Golden Plover *Pluvialis fulva*, Curlew Sandpiper *Calidris ferruginea*, and the Double-banded Dotterel.

RESULTS

Seasonal occurrences and abundances of the various species were as follows:

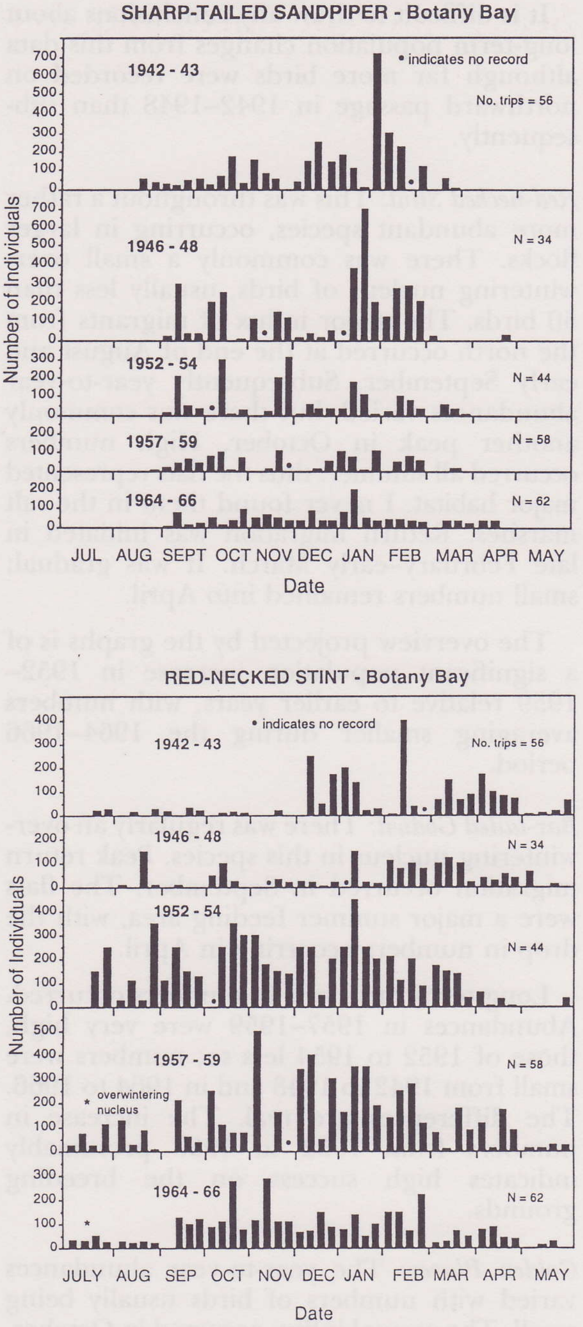

Fig. 1. Seasonal occurrences and abundances, Sharp-tailed Sandpiper and Red-necked Stint, Botany Bay mudflats, five clusters of years from 1942 to 1966.

Sharp-tailed Sandpiper: Typically this species arrived in the first week of September, with a major influx occurring in the second week. Then there tended to be a numerical drop, and a second peak in early October. In contrast to the others this species did not exclusively utilize the flats; a more favoured summering habitat was saltmarsh and muddy creeks entering the bay (writer's data). From late October until early January flocks of birds were continuously present on the flats but in small numbers of 50 to 100. Large numbers appeared again in January: possibly representing birds from further south, or in response to improved resources. Usually the bulk disappeared by the end of February, but in some years small numbers lingered on into March, and even early April. None were ever recorded between April and early August. Presumably the late August birds recorded in 1942–1943 represented early returnees, and not over-wintering birds.

It is difficult to draw any conclusions about long-term population changes from this data although far more birds were recorded on northward passage in 1942–1948 than subsequently.

Red-necked Stint: This was throughout a rather more abundant species, occurring in larger flocks. There was commonly a small over-wintering nucleus of birds, usually less than 50 birds. The major influx of migrants from the north occurred at the end of August and early September. Subsequently year-to-year abundances varied, but there was commonly another peak in October. High numbers occurred all summer: thus the flats represented major habitat. I never found them in the salt marshes. Return migration was initiated in late February–early March. It was gradual; small numbers remained into April.

The overview projected by the graphs is of a significant population increase in 1952–1959 relative to earlier years, with numbers averaging smaller during the 1964–1966 period.

Bar-tailed Godwit: There was regularly an over-wintering nucleus in this species. Peak return migration occurred in September. The flats were a major summer feeding area, with the drop in numbers occurring in April.

Long-term variations in numbers occurred. Abundances in 1957–1959 were very high, those of 1952 to 1954 less so; numbers were small from 1942 to 1948 and in 1964 to 1966. The differences are real. The increase in numbers from 1952 to 1959 presumably indicates high success on the breeding grounds.

Golden Plover: The year-to-year abundances varied with numbers of birds usually being small. The annual influx occurred in October. There was a regularly occurring November–February population, with a buildup in numbers in the latter month, and a peak in March before department in March–April. Characteristically no birds over-wintered. From time to time I found Golden Plover feeding flocks on the grassed Barton Park from the Bay, but they only stayed brief periods and there was no pattern in their time of appearance. Populations in the area were relatively constant over the 20-year period.

Curlew Sandpiper: This species was recorded in August but there was a striking influx of migrants at the end of September–early October. The birds were abundant feeding residents all summer. There was a clearcut numerical drop at the end of January, but in some years they remained during February and, especially in the 1964–1966 period, in March. No members of this species over-wintered.

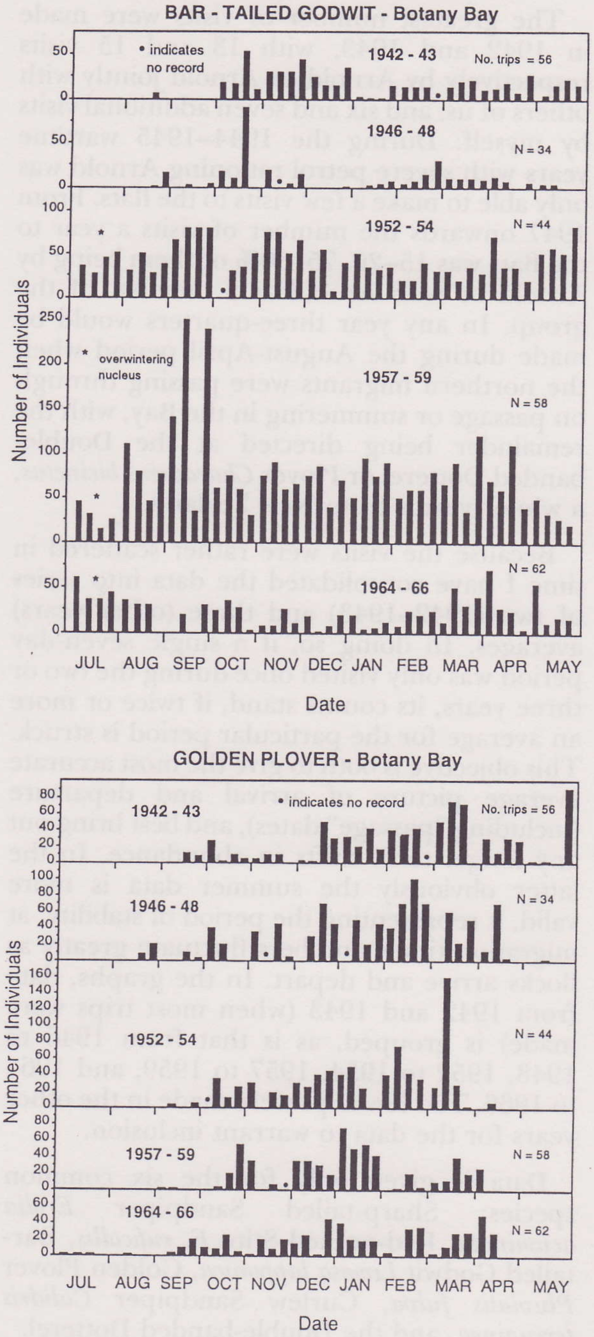

Fig. 2. Seasonal occurrences and abundances, Bar-tailed Godwit and Golden Plover, Botany Bay, 1942–1966.

During 1942–1943 the Curlew Sandpiper occurred only in modest numbers but thereafter was an abundant summer species. Highest numbers occurred in the later years.

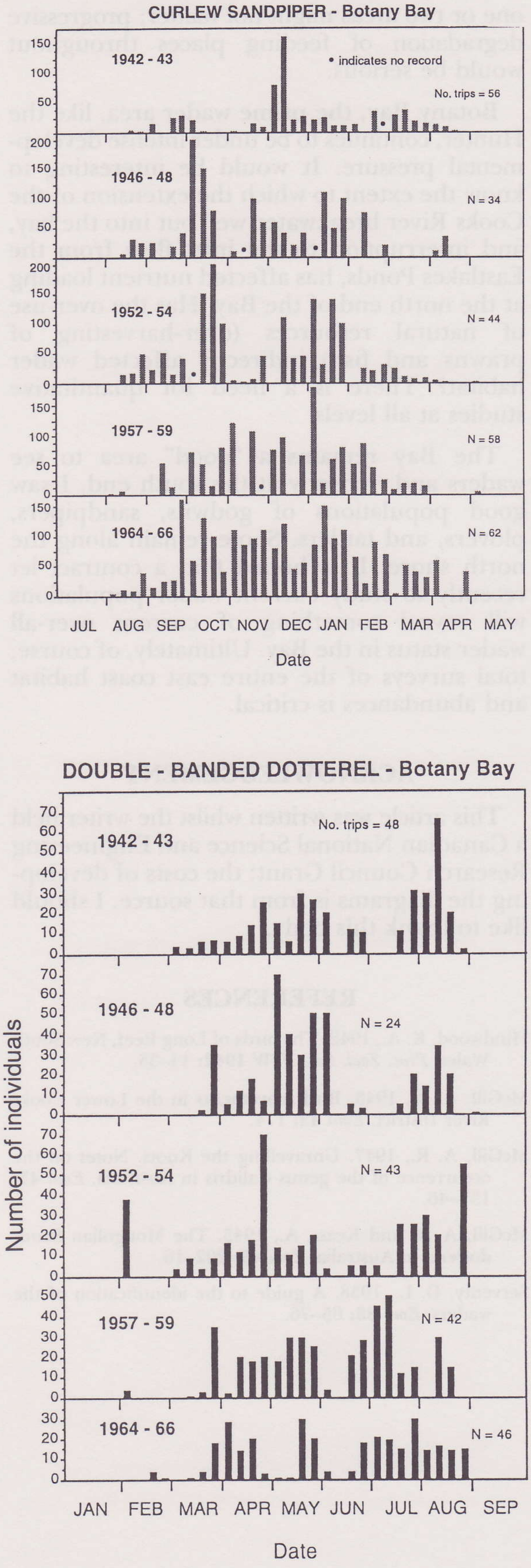

Fig. 3. Seasonal occurrences and abundances, Curlew Sandpiper and Double-banded Dotterel, Botany Bay, 1942–1966.

Double-banded Dotterel (Plover): This species arrived at the end of March and tended to remain in good numbers until late May. Thereafter there was a drop in numbers, with the time of this varying, followed by high numbers from late June to the end of August. Presumably there was some seasonal adjustment during the stay in response to resources.

Numbers were relatively uniform from 1942 to 1966.

DISCUSSION

The arrival and departure times of the six species are fairly constant but showed year to year variation by a couple of weeks. This could partly be an artifact of the way the data was collected. However, in all cases there was obviously a spread in times, i.e., in the arrival and departure of flocks. Numbers of birds were highest at times of passage. The major status of Botany Bay as a residence area for waders is amply confirmed. Small numbers of stints and godwits overwintered and did not return north to breed.

Duration of stay in the bay varied with the species; September-February with the Sharp-tailed Sandpiper; Curlew Sandpiper, October–February. The stay of six and five months in these species was eclipsed by the eight to nine months of the Bar-tailed Godwit. The stay was five months with the Double-banded Plover, which was present at the opposite time of the year to the other species.

The mid-season counts can be used to assess changes in abundance. The Sharp-tailed Sandpiper (though numbers on northward passage showed a drop after the first years), Golden Plover, and Double-banded Plover, maintained fairly constant populations throughout the period. Increases in numbers of Red-necked Stints and Bar-tailed Godwits over the 1952–1959 period are indicated; and the Curlew Sandpiper numbers increased in the final years.

Because flocks may pass through quickly, more regular counts than those made here would be necessary to assess numbers of birds on passage. It would be valuable to know how long migrating flocks stay in the Bay. It is likely that southward moving flocks stay longer than the reverse, as is the case with passerines in the Northern Hemisphere, associated with the need to establish breeding territories. Doubtless many flocks over-flew Botany Bay and would not be included in the counts.

Differences in numbers of birds summering in the Bay over the 20-year period reflects, I suspect, varying reproductive successes on the breeding grounds rather than conditions in Australia. Unfortunately no data was gathered on year-to-year variation in the prey resource base in Australia: resolution of the matter would require this.

BOTANY BAY AS A PRESENT AND FUTURE WADER HABITAT

The present data set, as a basis for making comparisons with contemporary numbers of waders, should be used with caution. The area covered in the surveys was not precisely measured: indeed it would have been difficult to do better because the flocks ranged widely. This was, however, taken into consideration throughout the surveys and the count-area kept sufficiently large to accommodate this. Unfortunately, the feeding wader populations at the southern end of Botany Bay, e.g., in Quibrey and Yowie Bays, were not simultaneously monitored: we had all we could handle with the high numbers at the northern end. This would make it impossible to compare total Botany Bay wader populations then and now. It would be worth while developing numbers as a ratio of available feeding area in 1940 with that of today. The smaller area of feeding habitat now remaining could, however, represent the "best" or "worst" section of the old habitat: what is left could, alternatively, have become secondarily nutritionally enriched or have become a "desert".

Obviously the health of our migratory wader populations cannot be assessed just in terms of Botany Bay studies. Southward moving waders have a series of potential feeding areas available to them, separated by long gaps: sections of Cape York, the Cairns waterfront, Moreton Bay, the Hunter, Botany Bay, and Lake Illawarra. Presumably they will linger in any one area proportionately to their immediate nutritional needs and to the quality and amount of food available. Presumably loss of one or two areas might not matter; progressive degradation of feeding places throughout would be serious.

Botany Bay, the prime wader area, like the Hunter, continues to be under intense developmental pressure. It would be interesting to know the extent to which the extension of the Cooks River breakwater well out into the bay, and interruption to the inlet flow from the Eastlakes Ponds, has affected nutrient loading at the north end of the Bay. Has the over-use of natural resources (over-harvesting of prawns and fish) indirectly affected wader habitat? There is a need for quantitative studies at all levels.

The Bay remains a "good" area to see waders and, recently at the south end, I saw good populations of godwits, sandpipers, plovers, and tattlers. Some remain along the north shore. It is hoped that a contract let recently to study current wader populations will reveal something of current over-all wader status in the Bay. Ultimately, of course, total surveys of the entire east coast habitat and abundances is critical.

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